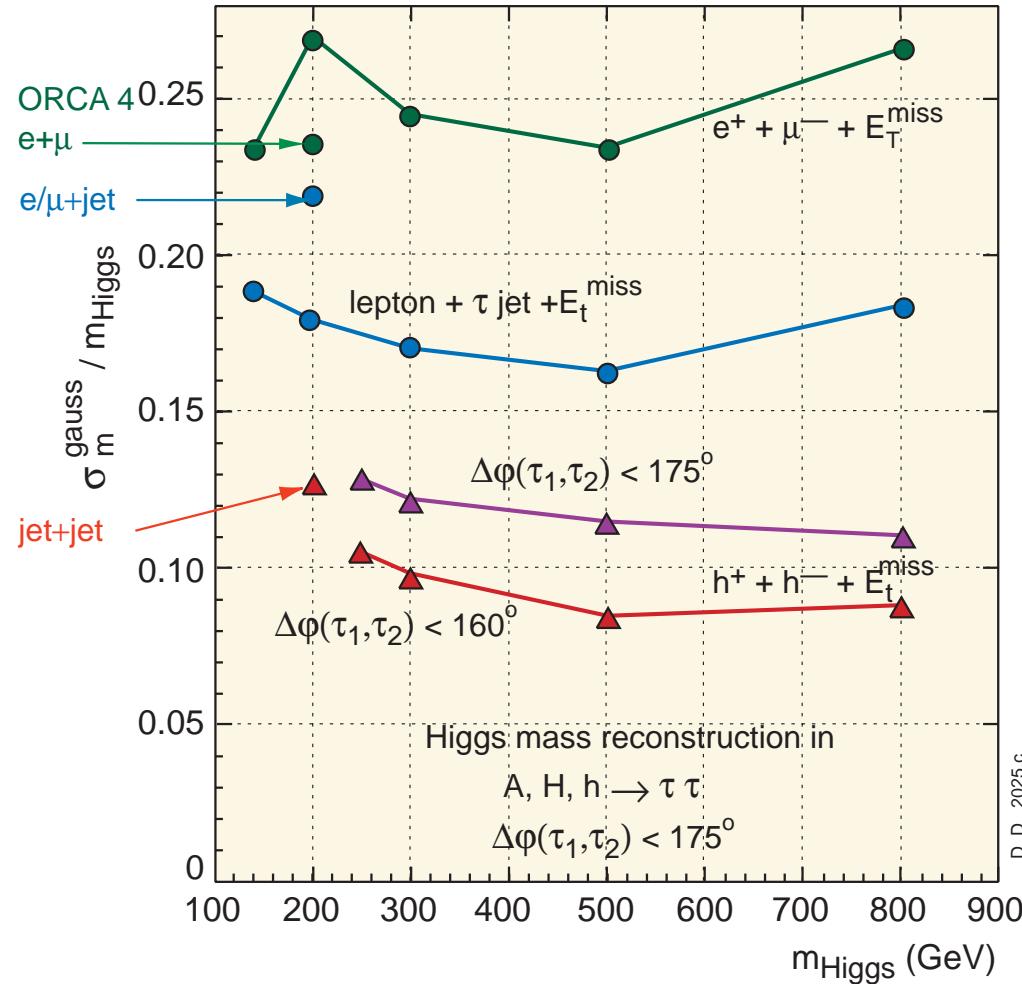


A. Nikitenko CERN EP / ITEP Moscow

**Problems of mass reconstruction in
susy H, gg->bbH, H->2τ->2j, M_H=200, 500 GeV
at luminosity 10³³ cm⁻² s⁻¹**

**cms116/orca420 events. default energy thresholds on digi : 60 (300) MeV / crystal ecal barrel (endcap)
300 MeV / HCAL readout**

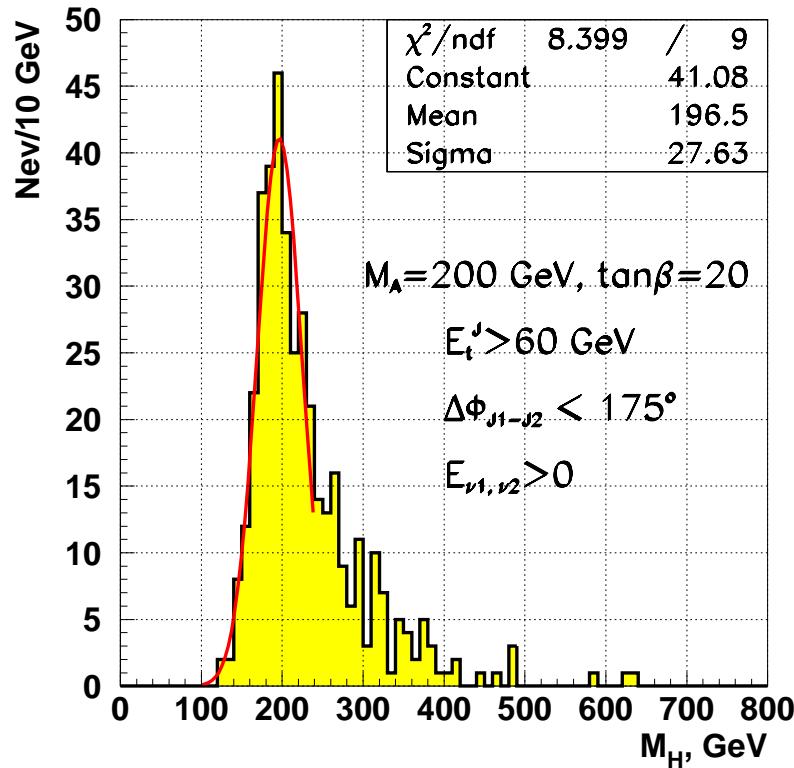
Higgs mass resolution in $H \rightarrow \tau^+ \tau^-$



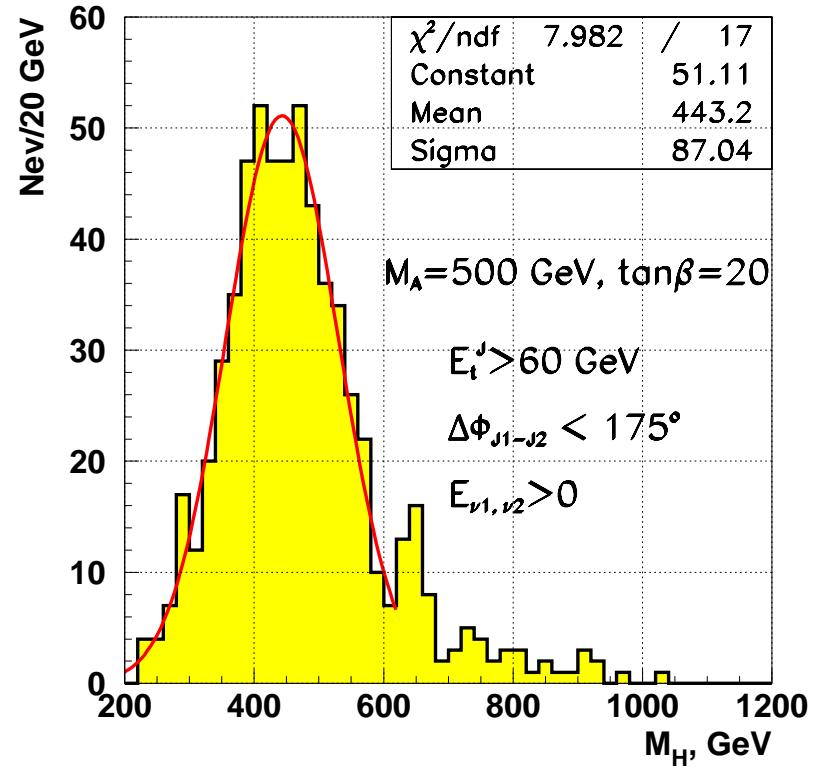
what's about $M_H = 500 \text{ GeV}$?

cmsim116/orca4 data at $L=10^{33} \text{cm}^{-2}\text{s}^{-1}$

$\sigma / M = 14 \%$



$\sigma / M = 20 \%$

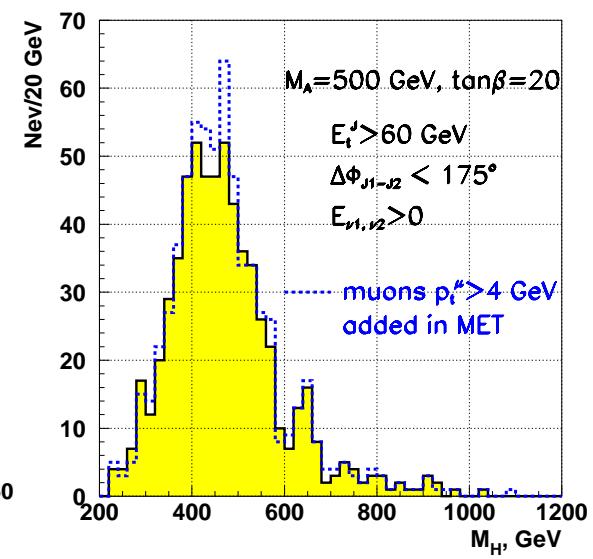
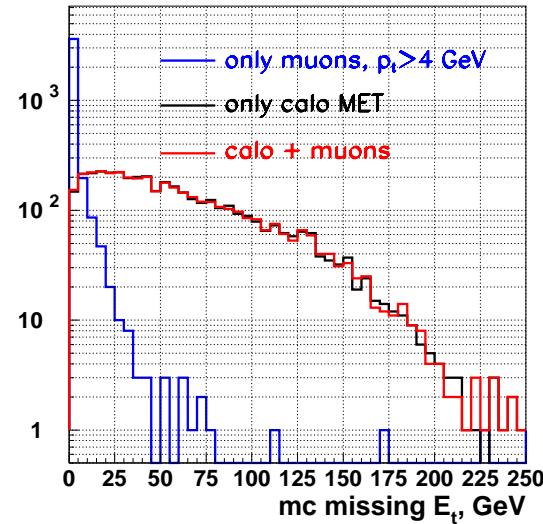
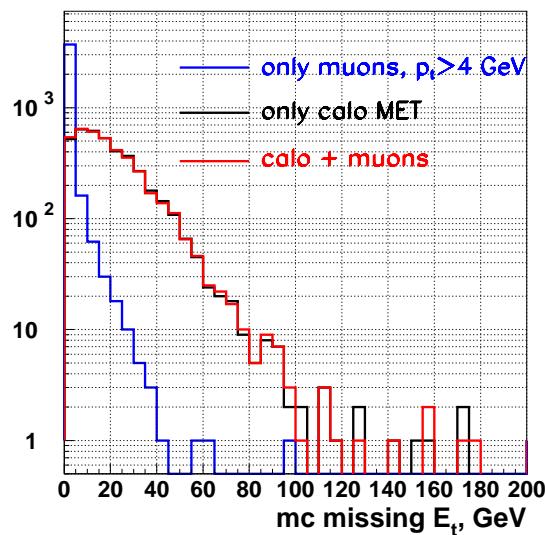


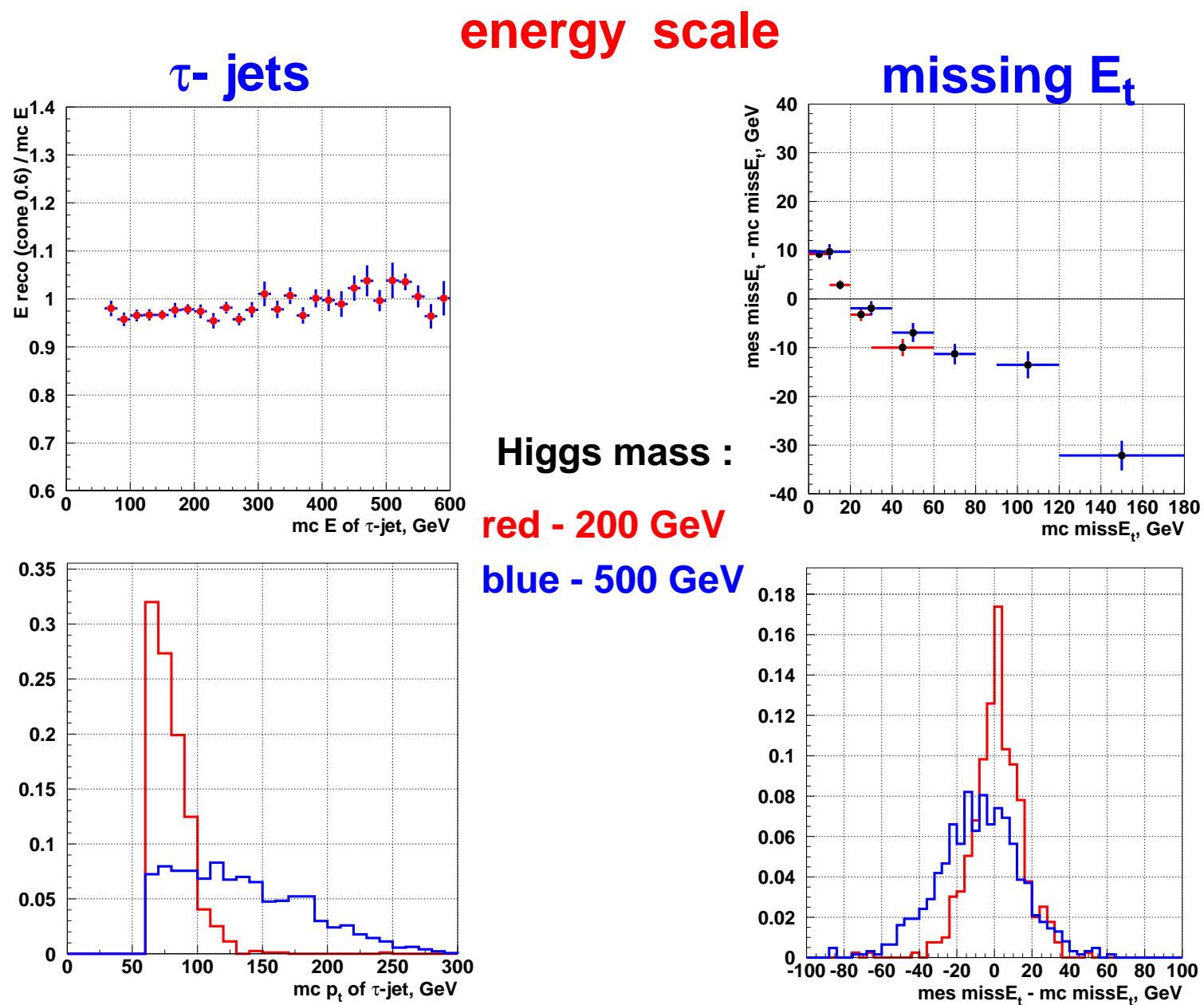
cmsjet : 13 %

13.4 %

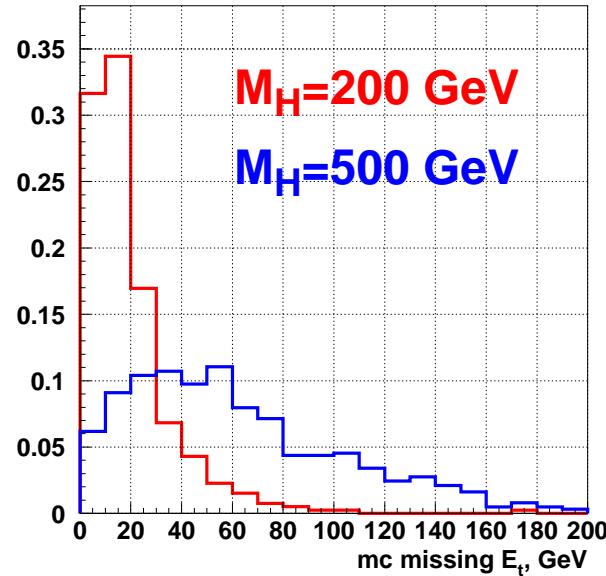
why 500 GeV Higgs has a worse resolution ?

Muons (mainly from bb in gg->bbH events) are not added in MET and scalar E_t in this analysis since muon contribution is small





Mass resolution is dominated by miss E_t measurement

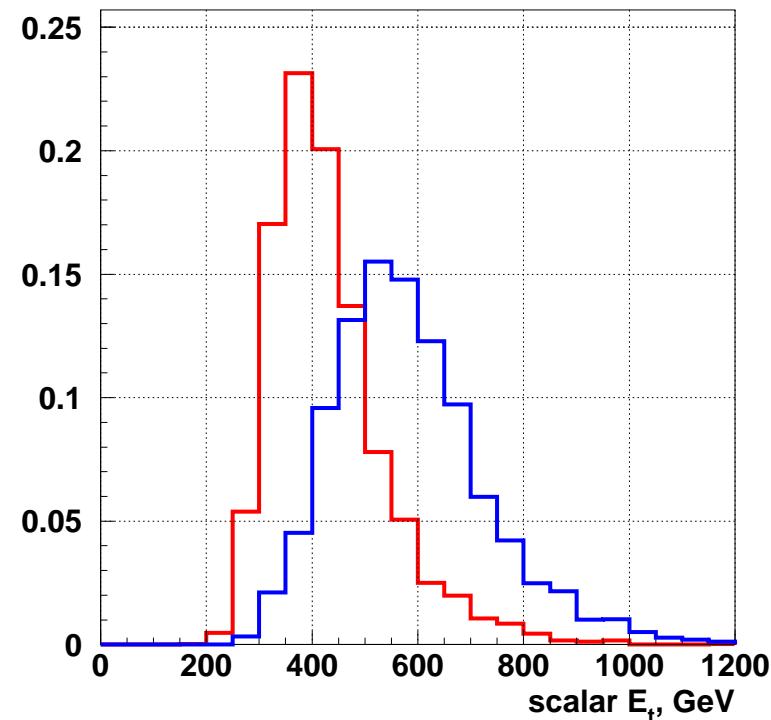
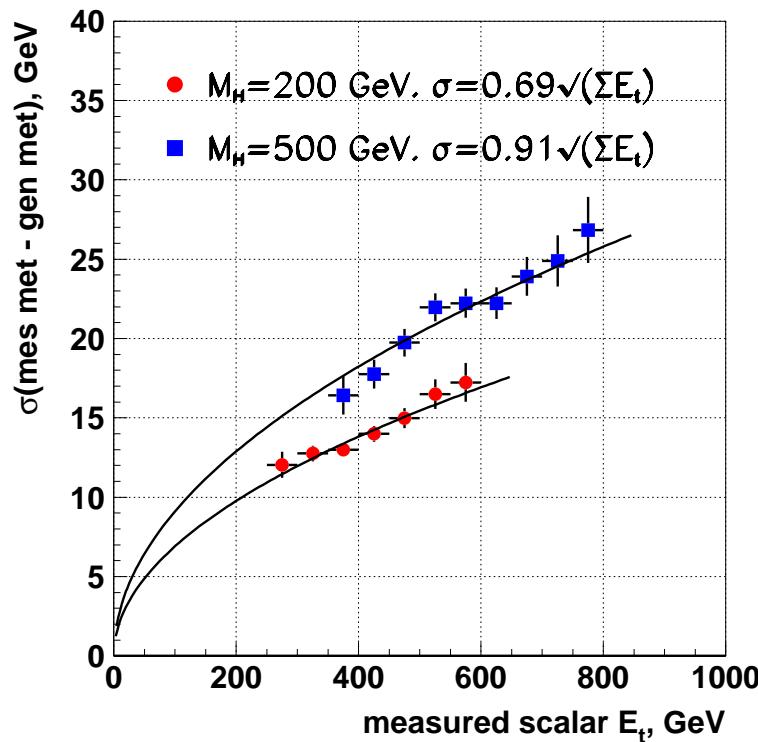


higgs mass	mass resolution $\sigma / \langle m \rangle$, %	mass resolution with mc tau-jets*
200	14.0 %	13.0 %
500	20.0 %	18.0 %

* $E_t = E_J + E_V$. $E_J^{\text{reco}} \rightarrow E_J^{\text{mc}}$, $E_{t \times(y)}^{\text{miss}} \rightarrow E_{t \times(y)}^{\text{miss mes}} - E_{J \times(y)}^{\text{mes}} + E_{J \times(y)}^{\text{mc}}$

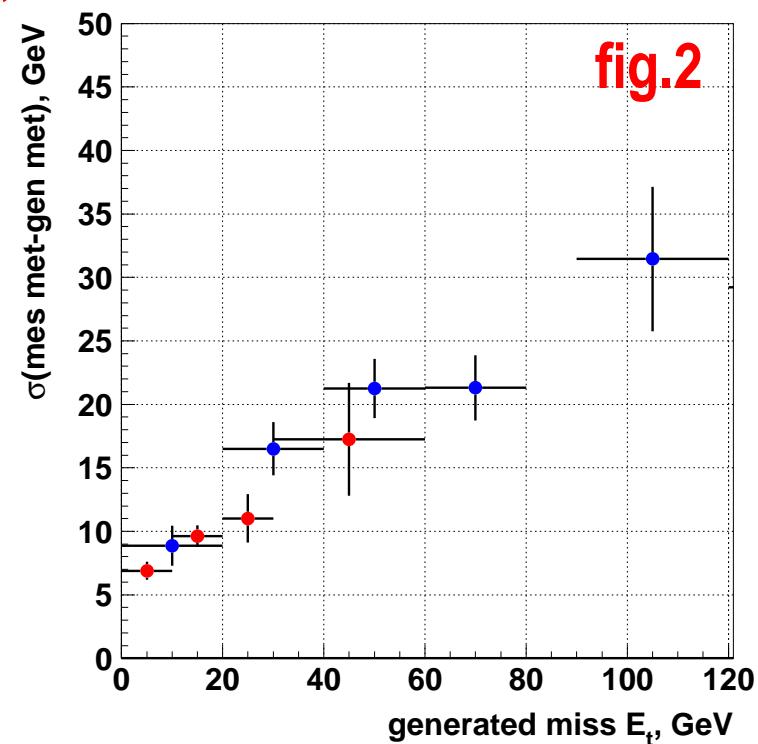
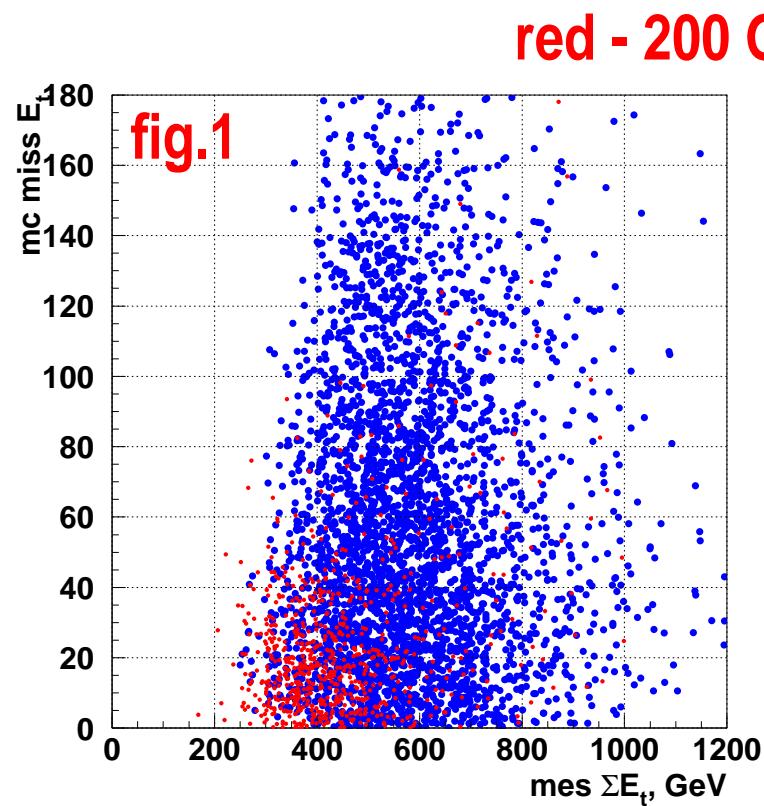
missing E_t (MET) resolution depends on scalar E_t

red - Higgs mass 200 GeV
blue - Higgs mass 500 GeV



why for the same ΣE_t , MET resolutions is worse for $M_H=500$ GeV ?

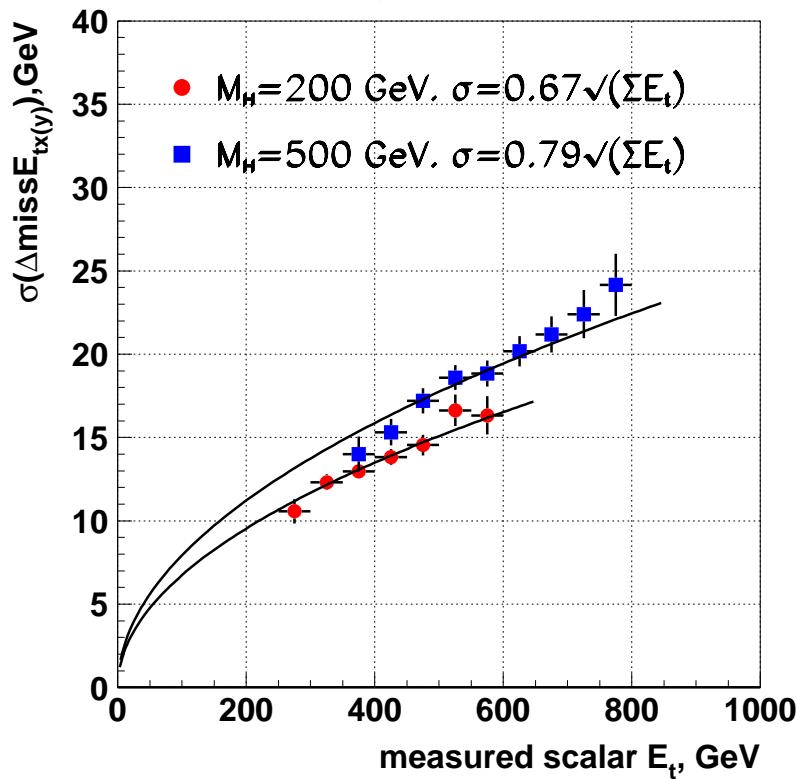
because for the same ΣE_t , $\langle \text{MET} \rangle$ is bigger for $M_H = 500 \text{ GeV}$
(fig.1) and absolute MET resolution is worse (fig.2)



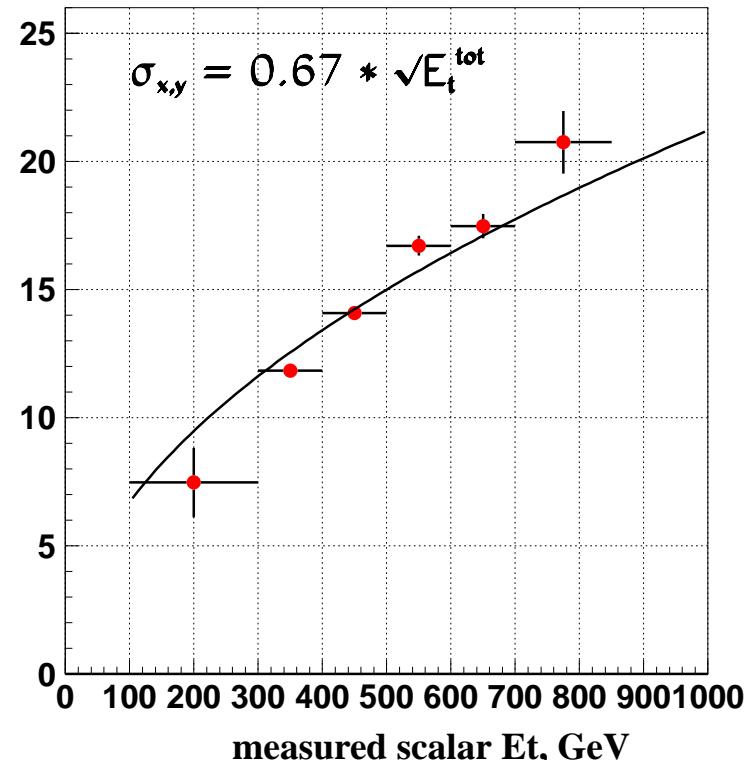
missing E_t x(y) resolution v.s. scalar E_t

$$L = 10^{33} \text{ cm}^{-2} \text{ s}^{-1}$$

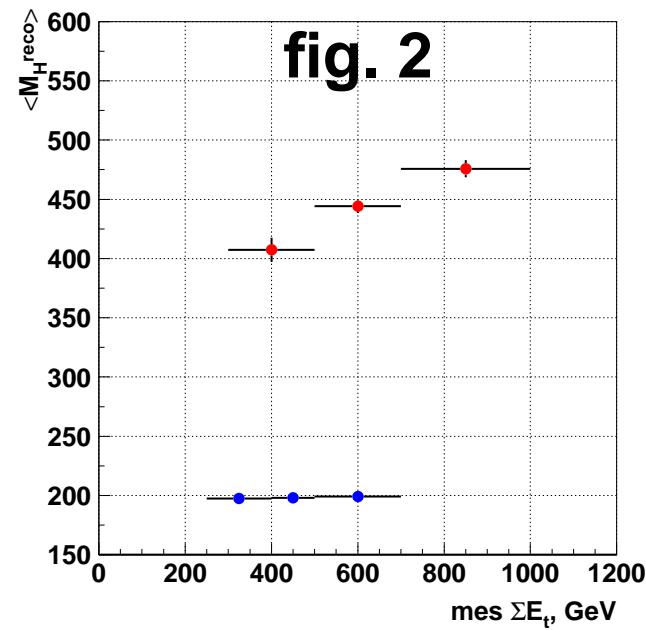
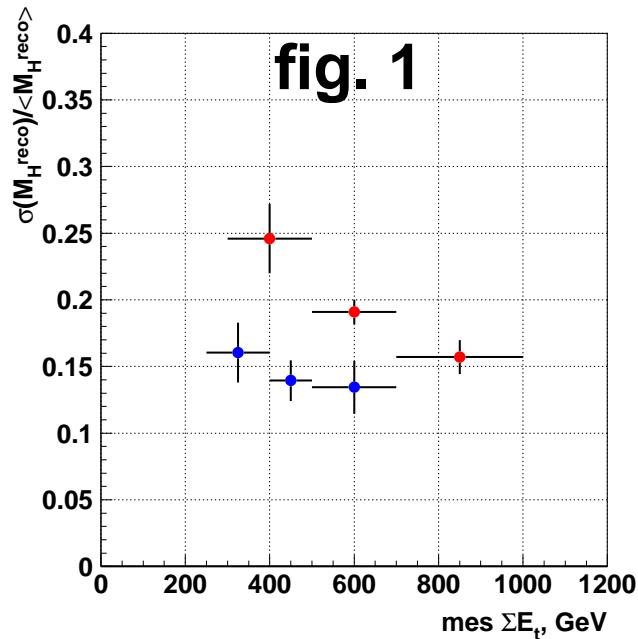
Signal



qcd bkg., 2 jets $E_t > 60 \text{ GeV}$



Higgs mass resolution improves with increasing of ΣE_t (fig. 1), however $\langle M_H^{\text{reco}} \rangle$ varies with ΣE_t (fig. 2)

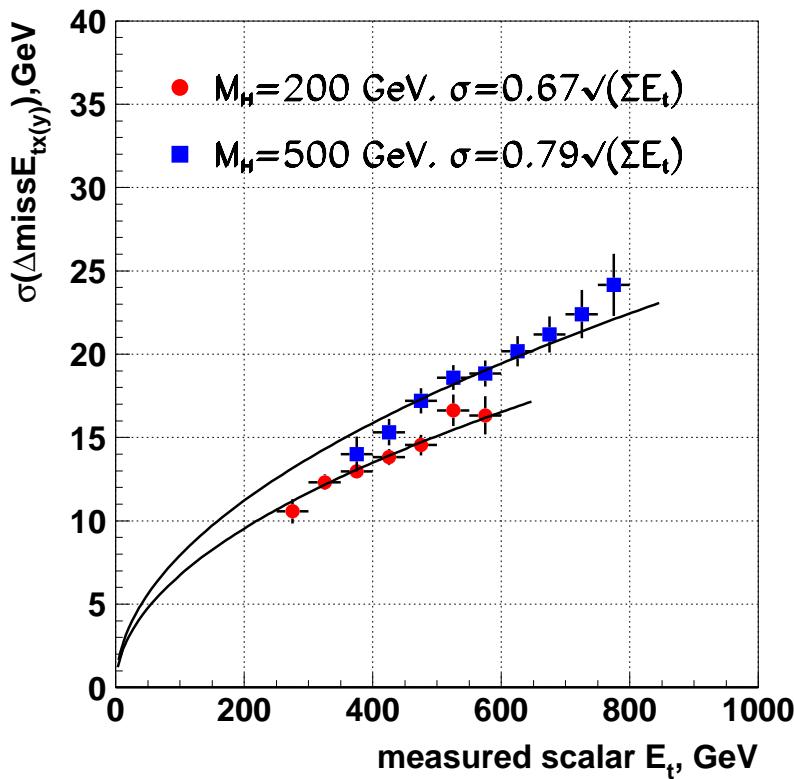


this variation of $\langle M_H^{\text{reco}} \rangle$ with ΣE_t spoils mass resolution for 500 GeV Higgs

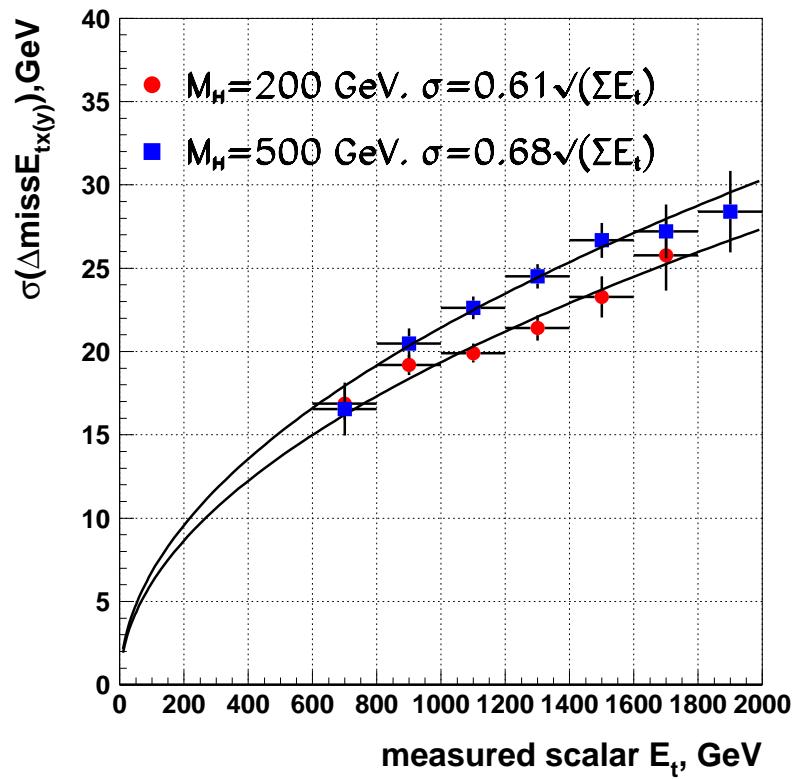
variation of τ-jet energy scale is less than 4 %, so the major contribution spoiling resolution are not tau's

missing E_t $x(y)$ resolution v.s. scalar E_t v.s. luminosity

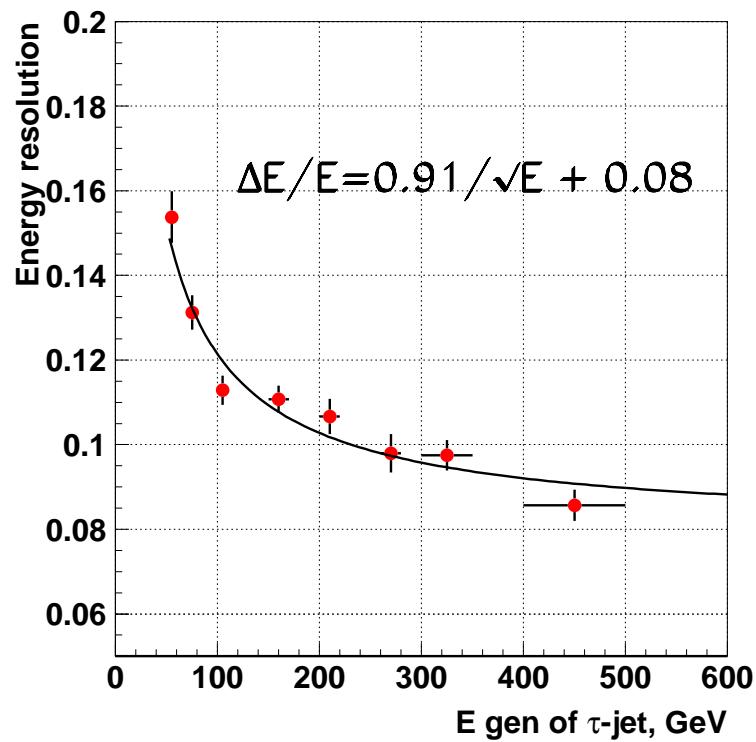
$$L = 10^{33} \text{ cm}^{-2} \text{ s}^{-1}$$



$$L = 10^{34} \text{ cm}^{-2} \text{ s}^{-1}$$



τ - jet resolution



qcd - jet resolution in $|\eta| < 0.7$

